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Management Functions of Information System Components as an Integration Model

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Abstract

Management functions develop first, as systematic steps to carry out management activities, while information components system follow later as part of management elements, where both must be integrated in order to make its practical implementation more clear. Management Functions and Information System Components as an integration model are (1) to explain Management Functions, Information System Components, Goals and Benefit related to Information System and (2) to explain integration process of Management Functions with Information System Component to get goals and benefits as an integrated model. Research method using expert method has done an integration of management function, which includes the cycle of P, O, A, C, E and I, to run management process, must be step by step, and as a cycle. Information components include S, H, F, B, and T and must have minimum requirement. Management of Information System needs goals and benefits that can be calculated clearly and specifically. To get goals and benefits in excellence performance are needed the integrated process to coordinate management functions and information system components, as an Integrated Model with an example in applications of software in Nosocomial Infection Control for Hospital, as the figure below.

Keywords: management functions, information system components, integration model, goal, benefit

1. Introduction

1.1. History of management functions and information system components

The function of management as a systematic step continues to grow since long time, and it began from

- POAC (Planning, Organizing, Actuating, and Controlling);

becomes,

- POACD (Planning, Organizing, Actuating, Controlling, Directing);

becomes,

- POACE (Planning, Organizing, Actuating, Controlling, Evaluating);

becomes,

- POACEI (Planning, Organizing, Actuating, Controlling, Evaluating, Innovation).

It provides a systematic, important step forward in order to implement practical management activities. Thus, running the management becomes easy using the systematic step.

In addition to management functions, there are also elements of management, which continues to grow as well, namely

- 5 M (Man, Money, Method, Material, Market);

becomes,

- 5 M + T (Man, Money, Method, Material, Market, Technology);

becomes,

- 5 M + T + I (Man, Money, Method, Material, Market, Technology, Information). This information is originally only data that are processed, as a material to perform step activities.

Today's complex organizational activities, and the changing times and rapid and sophisticated technologies are due to

1. increasingly difficult and expensive resources;
2. an era of competition that demands quality service;
3. the increasing demands and expectations of the community with the support of technology.

Moreover, in relation to a system of information that develops extraordinarily and is moving in disruption [1], it requires a past, present, and future study, in order to make adequate anticipation to avoid the agitation and destruction of the information system and at the same time the destruction of its organization.

The latest development of the management function and components of information systems requires integrated effort, due to resource constraints and the need to achieve effectiveness and efficiency significantly; then, the integration needs to explain the relationship between the management function with the components of information systems so that there is a clear integration. Based on the above, the aims of Management Functions of Information System Components as an Integration Model [2] are (1) to explain Management Functions, Goals and Benefits related to Information System Components; and (2) to explain integration process of Management Functions with Information System Components to get goals and benefits from integrated model.

There is a need to clarify the linkage between the management function and the information system components so as to illustrate linkages [3], as well as the linkages that can be measured in terms of the linkage having loads [4] which can be taken into account either qualitatively or quantitatively; then, the linkage is an integration that can easily be done both in terms of component and overall. With the three things: clarity, measurable linkages, and easy to implement, there is evidence of the need for integration, if not the two namely management functions and components information systems where efforts and goals run individually and as a whole which will not achieve the goal. Thus, the integration between the management function and the components of the information system will help achieve an integrated relationship so that it will achieve the goal more easily.

1.2. Management function

Management [5] in accordance with the classical definition is “coordination between various resources through the process of planning, organizing, there is control ability to achieve goals.” While the important goal of management is to achieve effectiveness and efficiency, the achievement of this goal is an important characteristic of management [6]. The latest definition according to the recent times is strategic thinking to gain a competitive advantage [7]. Various experts put forward various management functions which include the following:

1. Is group of manager activities in performing their functions, namely planning, organizing, directing, and controlling [8]
2. the description of the classic management function is the POACE (Planning, Organizing, Actuating, Controlling, and Evaluating) function, as shown in the following explanation [9] **Table 1**.

The Management Functions shown in **Table 1** is the recurring cycle, meaning that after the evaluation is done, it will be an input for the next planning. When described with the latest view today, which is related to the development of communication and information technology, there is a new function called INNOVATING [10]; without any innovation, then the company will be left behind and sooner or later will die by itself. Based on this reason, the current POACEI management function is described in **Figure 1** as a cycle.

1.3. Information system component

In general, information systems-related subsystems include the following [11]:

1. inputs, which are facts and data that have not been processed;
2. process, which is related to efforts to transform or transform data into information;
3. output, which displays the result of changes of data that has been in though and useful form of information.

A complete picture about the interrelation of subsystem can be shown in **Figure 2** [12].

Feedback is a description showing the return or continuous return of information to data back, by a controlled process or not. Thus, a system that is a unity of various subsystems in order to produce information is called information systems. In this case, as the goal is to achieve greater benefits of existing data, it is important to note the existence of components, interconnected to achieve certain goals. Information systems will run when there are components that support, move, and sustain the system. The information system is an intangible concept, tangible is its supporting components, visible, and can be measured. Information System Component [13] is important such as hardware, software, and network. After expanded of explanation, so components become as below (**Table 2**).

Code	Function	Explanation
P	Planning	Plan activities for the future.
O	Organizing	Organize for each activity and resources to be organized as needed.
A	Actuating	Carry out activities with full responsibility and continue to adjust to the plans and situations that occur.
C	Controlling	Controlling for implementation to fit the plan and lead to the achievement of goals.
E	Evaluating	Assess whether the plan works well and the goals can be achieved, if there are deviations, why and how to resolve and how to avoid recurrence.

Table 1. Management functions explanation.

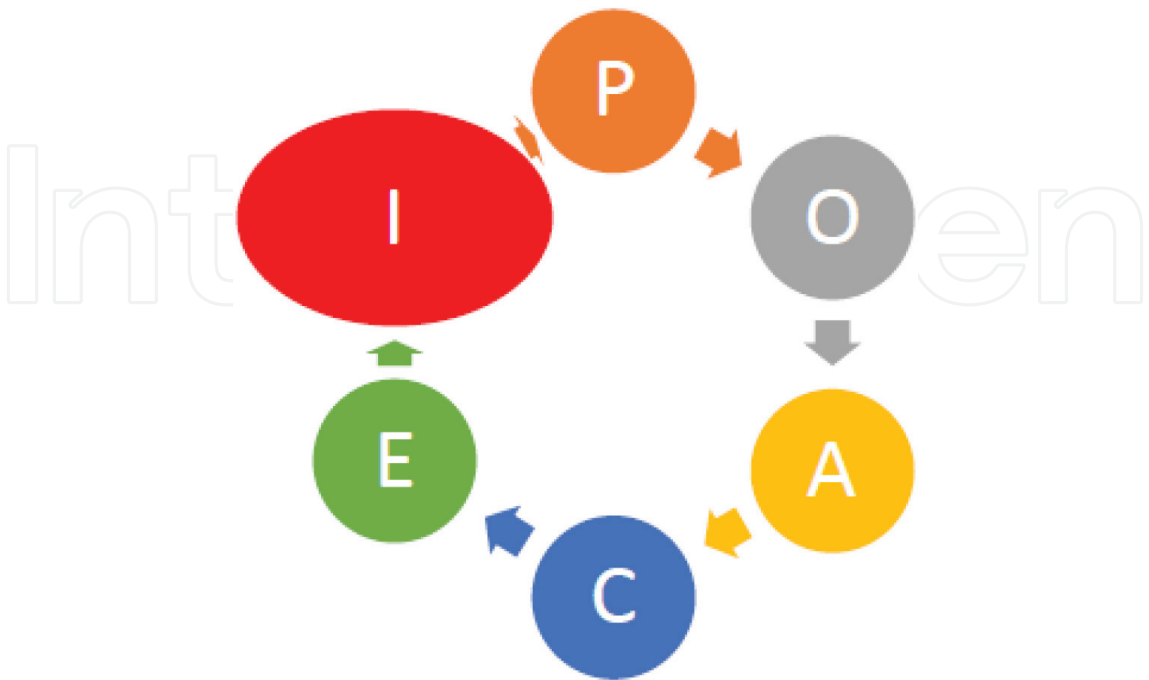


Figure 1. POACEI cycle.

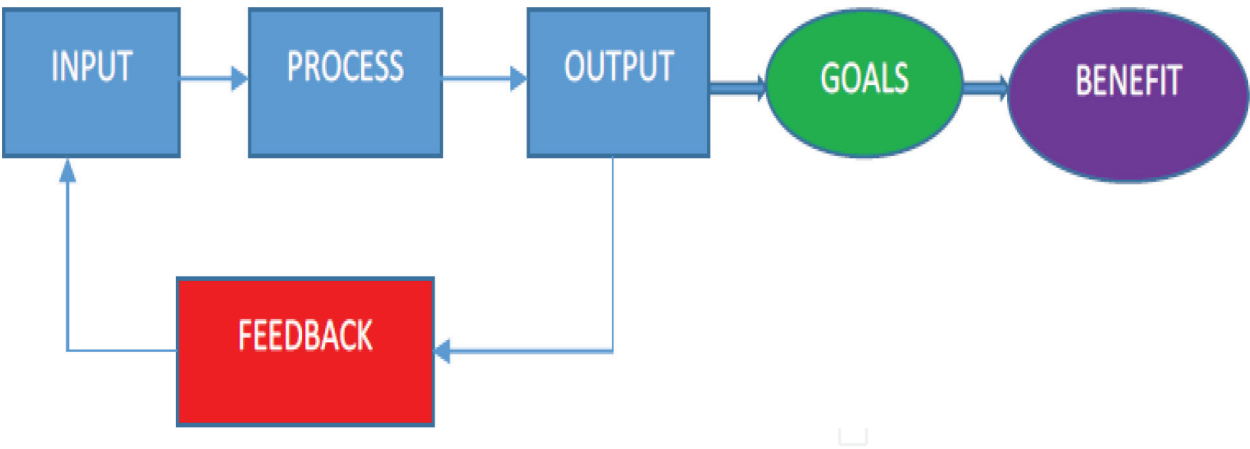


Figure 2. Information system.

No	Components	Subcomponents	Description
1.	Infrastructure	1. Room	Room for equipment and workplace
		2. Light	Electricity for power equipment
		3. Network	Base on Internet, online and offline, web-based, cloud system, smartphone related
2.	Hardware	1. Server	Hard disk with big capacity (SSD) as big data with Speed 4G
		2. Workstation	Amount sufficient, with the capacity as needed
3.	Software	1. Operating system	Compact, user friendly, developed gradually and continuously
		2. Help	There are facilities with sufficient explanation
		3. Trouble shooter	There are certain ways and options for some trouble conditions
4.	Brainware	1. User	Users who have received training on information systems and can use for decision making
		2. Training and guidance	There is a training module and user manual for correct telemedicine use, both hard and softcopy about the information system used
		3. Operator	Qualifications and competencies that suit your needs
5.	Technology	1. Cable	Using a wired system to funnel data
		2. Wireless	Use frequency to connect
		3. Satellite	Satellite-based for contacts

Table 2. Information system component.

2. Goals and benefits of integration

2.1. Goals

The classic goal of management is to achieve:

1. Effectiveness [14]; with the understanding of the results achieved in accordance with the expected target, in this case, the targeted target, and initial goals are important as a benchmark for success.
2. Efficiency is an achievement with cost-efficient but still achieves the expected quality value, so the cost is cheaper but the quality is maintained [15].

The two things above are important to provide information systems with the plan, the results achieved in accordance with expectations, the quality that is maintained and cost-efficient; thus, the information system can be smooth, well-performing, and ready to be continuously developed.

2.2. Benefit

Benefits to be achieved by the implementation of good management functions in managing information systems are the hope of disruptive situation [16] with characteristics including

1. high-quality achievement;
2. very low cost;
3. in the conditions of many new emerging competitors.

Number 3 is a key feature of the Disruptive Era, which needs to be anticipated; otherwise, it will not miss or die by itself.

3. Research method for integration model

The method used in order to develop an integrated model between management functions and information system components includes (1) literature study and (2) ask experts, as a

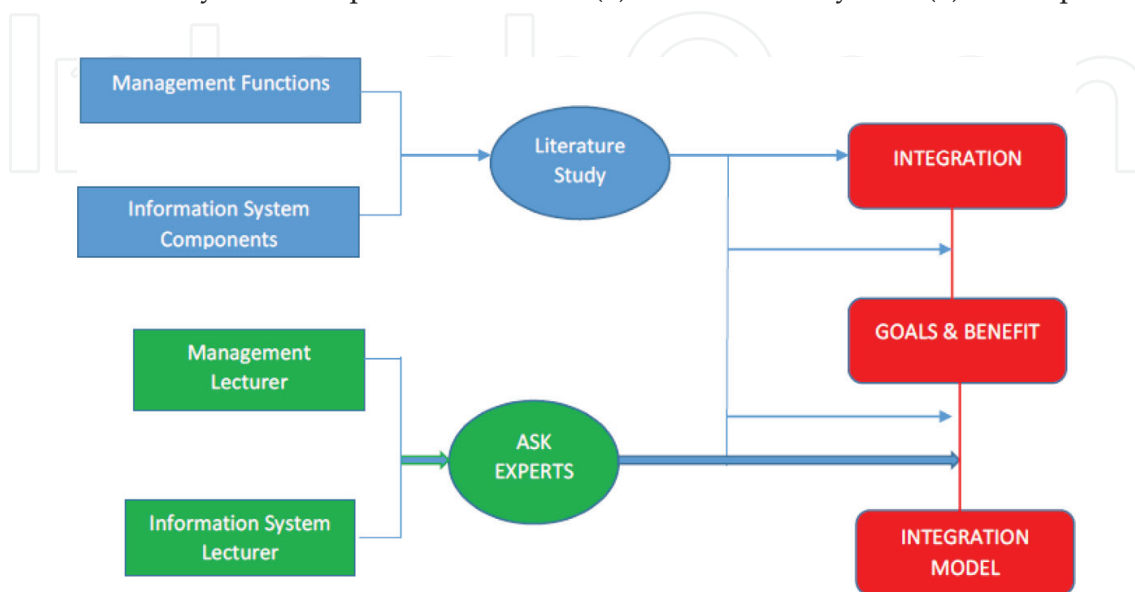


Figure 3. Research methods for integration.

qualitative research, conducted by action research [17]. Stages of activity include data collection, data analysis, and modeling [18]. This is described in **Figure 3**.

The description above shows a complete research process as a model that is ready to be done and implemented further, and follow three steps: (1) literature study for the collection of theoretical aspect; (2) ask expert, to get more input and more deep explanation; and (3) using a model in Nosocomial Infection Control in Hospital.

4. Integration model

4.1. Model

Management functions include cycle of P, O, A, C, E, and I, to run management process, must be step by step, and as a cycle, when P = Planning, O = Organizing, A = Actuating, C = Controlling, E = Evaluating, I = Innovating [19]. Information components include S, H, F, B, and T, must have a minimum requirement, when S = Infrastructure, H = Hardware, F = Software, B = Brain ware, T = Technology. Management of Information System needs goals and benefits that can be calculated clearly and specifically. The goals are effectiveness and efficiency and how the information system can be run. This model was developed by the asked expert method using the qualitative method by two experts, with the result of integration between Management Function and Information Components. The management function includes the cycle of P, O, A, C, E, and I, to run management process, must be step by step, and as a cycle, when P = Planning, O = Organizing, A = Actuating, C = Controlling, E = Evaluating, I = Innovating [19]. Information components include S, H, F, B, and T, must have a minimum requirement, when S = Infrastructure, H = Hardware, F = Software, B = Brain ware, T = Technology. Management of Information System needs goals and benefits that can be calculated clearly and specifically. The goals are effectiveness and efficiency and how the information system can be run to get these goals and benefits that must have a high quality and low price with many newcomers as competitors. To get goals and benefits of excellent performance need, the integrated process to coordinate management functions and information system components, as an Integrated Model, is shown in **Figure 4**.

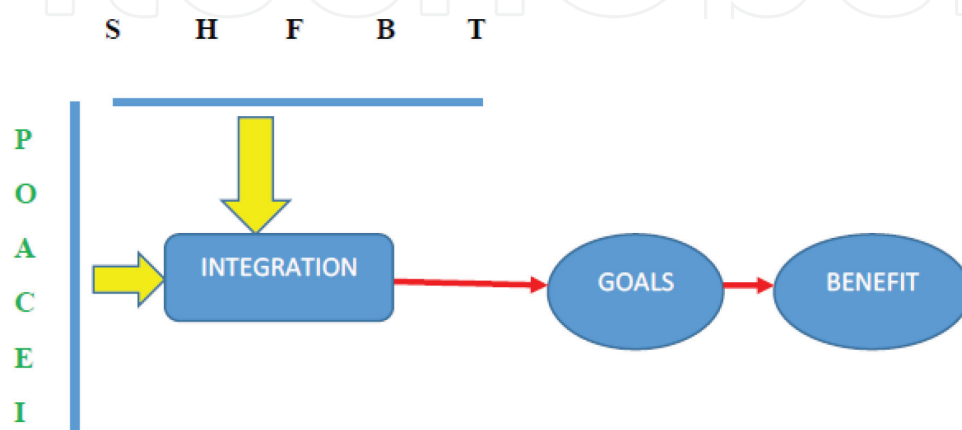


Figure 4. Integrated model of management functions and information system components.

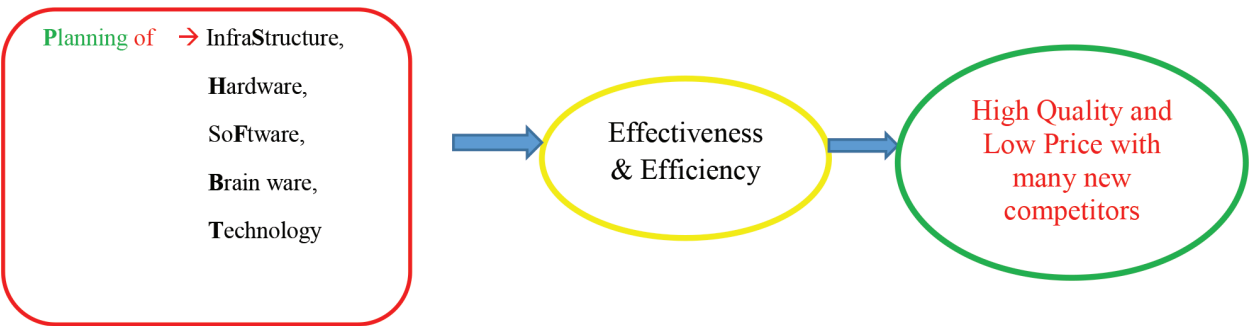


Figure 5. Integrated model in Planning-1.

To use model, we should start with the order of management functions vertically from top to bottom, namely Planning, Organizing, Actuating, Controlling, Innovating; then directed to the horizontal are infraStructure, Hardware, Software, Brain ware, and Technology. Thus, the Planning link as part of the Management Function and Information System Component needs to be linked to the subsequent management process. The following illustrates, for example, the interrelationships between planning: infraStructure, Hardware, software, Brain ware, and Technology, which must be described and should be a clear link to the achievement of effectiveness and efficiency. A clear and complete planning and accompanied by the achievement of effectiveness and efficiency will be the basis for achieving a high quality, low cost, and in the face of the abundance of existing and emerging competitor. Certainly, it is necessary that all the management functions be described completely and relevantly, the following related to planning only. This is shown in **Figure 5**.

A complete description, for example, overall integration in Planning-infrastructure, Planning-Hardware, Planning-software, Planning-Brain ware and Planning-Technology, is given. In **Table 3**,

M. F	ISC				
	Infrastructure	Hardware	Software	Brain ware	Technology
Planning	Procurement based on time and needs	Choice of appropriate specifications, including vendors and development plans	Determination to be used, including vendor to be selected and maintenance plan	User and Operator determination and required training program	Selection and linkage with anticipated development
Organizing					
Actuating					
Controlling					
Evaluating					
Innovating					

Note: ISC, Information System Components; MF, Management Functions.

Table 3. Integrated model in Planning-2.

Integrated Model in Planning is shown. This model has advantages due to integration, making it complete and systematic, with the weakness being the many actions that need to be done.

Organizing explanations include

1. organizing the position and the type of room, the need for electric power, and network settings;
2. organizing the location and type of hardware interspersed with servers and workstations to suit usage needs;
3. organizing software, related to Operating System, Help and Trouble Shooter required in operations;
4. organizing about Brain Ware related to the User regarding who and what criteria and training manuals and also guidelines for use that suit your needs;
5. organizing the use of technology that prospective related with data transfer, speed, cable, and satellite network as needed and relatively affordable.

Actuating explanations include

1. actuating on Infrastructure, indicating the existence of procedures of use, the operational procedures of the existing infrastructure, and linkages;
2. actuating on Hardware, related to hardware usage, use and maintenance procedures so that it clearly defines the standard used to prevent errors;
3. actuating on Software, encouraging proper execution with clear and easy to understand, and easy to understand guidelines and procedures;
4. actuating about Brain Ware, including the procedures and capacities necessary to be able to run the information system, including how to train and determine the authority of use;
5. actuating Technologies, including some guidelines and rules for the use and mapping of technologies, including the necessary development.

Controlling explanations include

1. controlling of Infrastructure, related to the benchmark used to measure the presence or absence of irregularities in the use of infractions such as space and electricity that need to be guaranteed to help;
2. controlling of Hardware, related to efforts to control servers and workstations to run in accordance with the objectives, and provide feedback for improvement;
3. controlling of Software, relating to various ways to be aware of any possible deviation, can provide alert, and can give an appearance of what happens to be understood as an error;
4. controlling of Brain Ware, in relation to the processes that occur as well as the behavior of users and operators in using information systems, so that they are ensured in the guidance;

5. controlling of Technologies, including monitoring and control of network and data transport, ensuring that there are no errors and flaws that interfere with interpretation results.

Evaluating explanations include

1. evaluating on Infrastructure, relating the results achieved in accordance with the planned activities with Room, Light, and Network, whether there are differences in the results of less or more;
2. evaluating about Hardware, related to hardware comparison in planning with existing, in terms of Server and Workstation, the difference seen or not;
3. evaluating about Software, discerning differences between Operational System, Help, and Trouble Shooter from planning to reality, whether adjustments or improvements are needed;
4. evaluating about Brain Ware, seeing the difference between a plan and a reality in terms of User and Operator, and the need to be spelled or customized;
5. evaluating Technology, examining the difference in terms of technology related to data transfer either with cable or wireless, between plans with reality, whether to be repaired or even to be replaced.

Innovating explanations include

1. innovating on Infrastructure is a present-day study into the future to see the possibilities of new things that arise, to anticipate and be prepared, related to Room, Light, and Network;
2. innovating about Hardware is a future thought to estimate the possibility of new things that need to be anticipated and prepared, especially with servers and workstations;
3. innovating about Software, rapid and sophisticated development, requires adequate anticipation, and follow-up will be able to keep up with the times;
4. innovating on Brain Ware, preparation, and anticipation, in relation to changes from the User and Operators, in order to obtain objectives and benefits, is intimidated by the changing of thoughts related to the Users and Operators;
5. innovating about Technology; this requires long-term thought and strong anticipation and possibly the existence of various alternatives, due to rapid progress and sophistication, resulting in a rapid technological obsolescence.

4.2. Example of nosocomial infection control for hospital

Applications of software in Nosocomial Control for Hospital, related to the notion of surveillance, include [20] “systematic, active and ongoing observation of the occurrence and spread of Nosocomial Infection in an event that causes increased or decreased risk.” The activities undertaken are collection data, data analysis, and information dissemination. Required data related to the type of nosocomial infection, location, number of affected, analyzed causes

and spread, disseminated to the responsible team. Associated with Information System Components (ISC) with its control as part of the management function, [21] (1) Integration Model, (2) Goals, and (3) Benefit are seen, which are related like the following description in Figure 6.

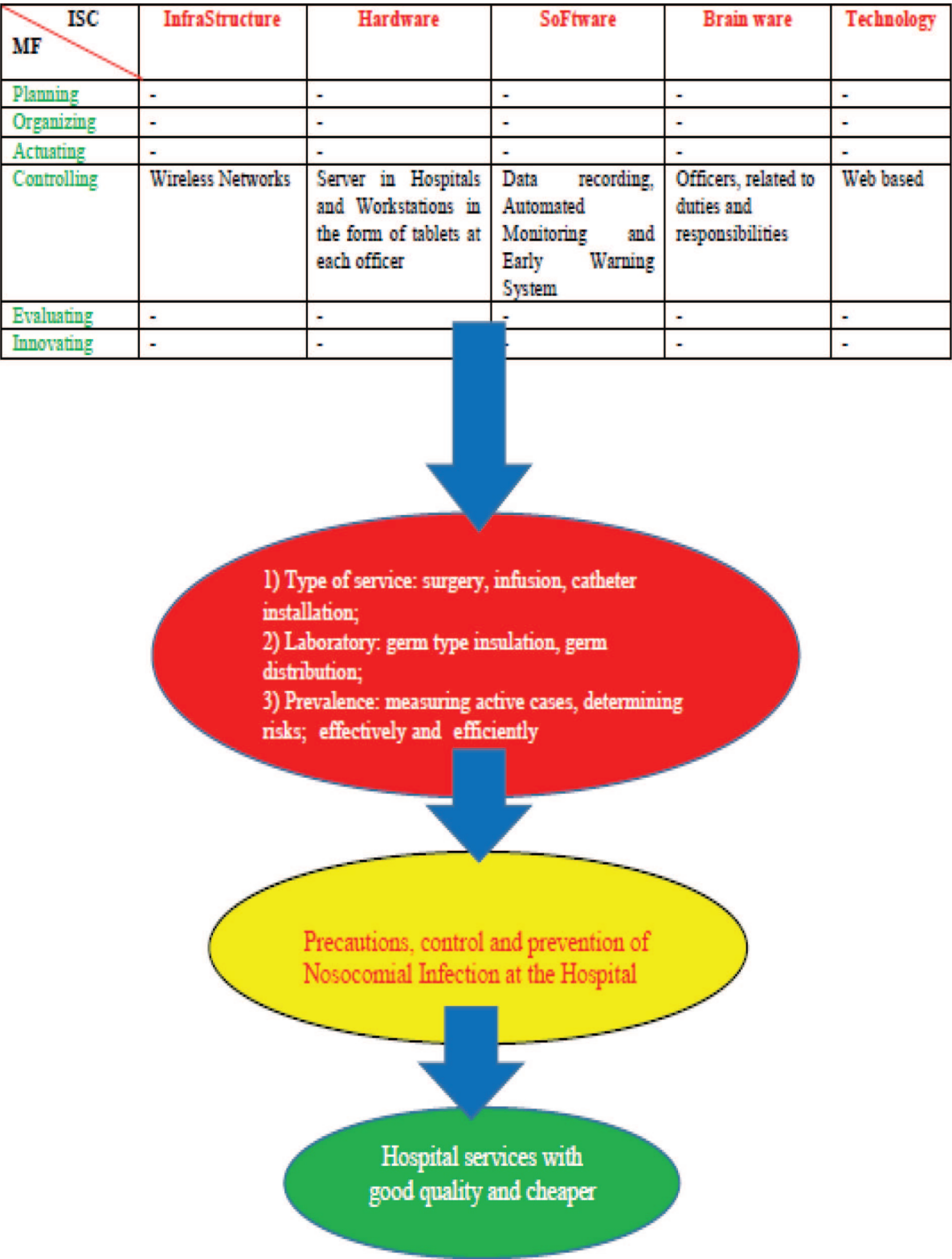


Figure 6. Nosocomial infection control for hospital in integrated model.

Explanation of the above figures, related to the relationship between Integration Model, with Goals to be achieved and Benefit to be obtained at the Nosocomial Infection Control for Hospital, is as follows.

4.2.1. Integration model

Explanation of Integration Model: related to process of control on

1. infrastructure: related to Wireless network,
2. hardware: related to Server in a hospital and workstation in the form of tablets at each officer,
3. software: related to Data Recording, Automatic Monitoring, and Early Warning System,
4. brain Ware: related to the officer related to duties and responsibilities,
5. technology: related to Web based.

As a complementary unity for the process of controlling activities related to the information system, the next is the nosocomial infection control activities in the hospital, which are related to

1. type of service: surgery, infusion, catheter installation;
2. laboratory: germ type insulation, germ distribution;
3. prevalence: measuring active cases, determining risks.

The above activities must be done effectively and efficiently.

4.2.2. Goals

The goals of nosocomial infection control activities in the hospital include

1. precautions,
2. control,
3. and prevention of nosocomial infection at the hospital

This can be done in a systematic and structured way by using information system, so that goals can be achieved clearly.

4.2.3. Benefit

To get continuous of goal achievements, then the benefit for Hospital Services will be obtained with good quality and cheaper as impact of using information system for Nosocomial Infection Control in Hospital.

The above illustration shows a clear link between the model with the objectives and benefits, which in general give the excess of ease in assembling the linkages in the implementation, although it requires a complete study from the beginning as a weakness.

5. Conclusion and suggestion

Integrated Model of Management Functions (MFs) and Information System Components (ISCs) will facilitate linking together in order to describe and integrated activities. Furthermore, it will directly facilitate demonstrating clear objectives and encouraging the making of relevant benefits. It is recommended to be used in the framework of education and training and to train the skills of managers in making programs or activity proposals related to information systems.

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